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REPORT ON A BOTANICAL TOUR IN KASHMIR,

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PREFACE.

THE project for a Botanical Survey of the Indian Empire having now taken shape, it is considered desirable that there should be some special channel through which the results of the Survey may be communicated to those interested in the progress of Botanical Science. It has therefore been decided to issue, under the title of "Records," such reports made by officers of the Survey as shall contain matter of botanical interest or of novelty. These Records will be published, not at fixed intervals, but from time to time as appropriate materials may be received.

REPORT

ON

A BOTANICAL TOUR IN KASHMIR, 1892.

I left Saharanpur for Kashmir on the 15th April, travelling by the ordinary rail and tonga route *viâ* Rawal Pindi and Murree. I had to halt a few days at each of these places in order to give time for the heavy baggage to reach Baramula, at which place I arrived on the 1st May. Leaving by boat on the same day I arrived at Srinagar on the 3rd. A few days were spent collecting plants in the neighbourhood and arranging for botanical tours in other parts of the valley.

I left Srinagar on the 9th for Pirni in the Jhelum Valley, about six miles below Baramulá. Here I was delayed some days owing to the illness and death by cholera of one of my botanical collectors. On the 15th I ascended the Kájnág range from Pirni to an elevation of about 9,000 feet, and remained there one day to collect specimens. On the following day the camp was moved to the summit of the ridge which is nearly 12,000 feet. The weather was fine, and remarkably clear views were obtained of the snowy ranges towards the north, including Nanga Parbat.

On the 18th I left the ridge, and descending by a steep path on the southern side pitched my camp in the Limbar *nullah*. On the following day some interesting specimens were collected up to 12,000 feet in a branch of the Limbar *nullah*, called the Taltal *nullah*.

On the 20th I went down the Limbar *nullah* to the Jhelum Valley and crossed the river at the ferry close to the village of Nowshera.

From here I took the short cut to Gulmarg, 22 miles distant. The path is very steep, and not a desirable one in wet weather. I halted at Sumbliáli that night, and spent the next day collecting plants in the Sumbliáli *nullah* up to about 11,000 feet.

The most interesting discovery on this day was a minute kind of Mistletoe parastical on the branches of *Pinus excelsa*. I originally found this plant in 1884 just within the border of Western Nepal,

growing on the same kind of tree and at about the same elevation (10,000-11,000 feet). It is published in the Flora of British India under the name of *Arceuthobium minutissimum.* It was afterwards gathered by Mr. Lace in Kunáwar, and I have since seen it, at Gulmarg, in the Sind Valley and in the Gudhai Valley of the Astor District. It is abundant also near Gurais in the Kishenganga Valley.

I arrived at Gulmarg on the 23rd, and spent several days there exploring the vegetation of the neighbourhood, which offers great variety owing to the abundant rainfall, the dense forests encircling the marg and the elevation of the surrounding mountains.

Baltistán and Gilgit Tour.—A brief sketch is here given in order to indicate more clearly the route which was followed.

Starting from Gulmarg on the 20th of June the route taken was as follows:—From Baramula by the Jhelum and Sind rivers to Gandarbal, up the Sind Valley *viâ* Sonamarg, to Báltal, and over the Zojí La to Dras. From Dras we proceeded in a north-westerly direction up the Marpu *nullah*, and over the Marpu La to Golteri in the Shingo Valley. Descending the Shingo Valley as far as the village of Fransart, we crossed over a high ridge, the water-shed of the Shingo and Shigar rivers, to the village of Shigar. After crossing the Shigar River by a jhula bridge we turned in a northerly direction up the Karpuchu Valley and went over the Bári La to a camping-ground overlooking the north-east corner of the Deosai plains. From here, keeping still towards the north, we crossed over the Shátung La and forded a big stream flowing towards the Deosai plains. About 500 feet above this was another pass which we had to cross in order to reach the head of the Khorbala *nullah*. From here, descending by a very steep and rocky path, we entered the Satpur Valley, and passing Satpur Village and Lake arrived at Skárdu in the Indus Valley on the 14th July.

From Skárdu we went one march up the Indus Valley to a place called Katzura, and from there up the Shigarthang Valley and over the Alampi La to Gudhai on the road from Bandipur to Gilgit. The rest of the journey to Gilgit was made along the new road *viâ* Astor and Bunji.

From Gilgit I made a short expedition to the Naltar Valley *viâ* Nomal in the Hunza Valley.

Returning from Gilgit on the 10th of August we took the same route as far as Gurikot below Astor. Here leaving the main Gilgit road we kept up the Astor Valley crossing the stream from the Rupal *nullah*, and thence into the Kamri Valley, and over the pass of that name, to Gurais in the Kishenganga Valley. After a few

days' halt we proceeded, *viâ* the Trâghal to Bandipur on the Woolar Lake and thence by boat to Srinagar.

I shall now give a rather more detailed account of this journey.

After traversing the Woolar Lake the usual course for boats proceeding to Srinagar is by the Noru Canal, which joins the main Jhelum River a little below the village of Shádipur, so called from the junction of the Sind River with the Jhelum. A large portion of the Woolar Lake during the month of June is a perfect garden of water-lilies and other aquatic flowering plants, including the 4-spined Singhára (*Trapa natans*) which is very abundant here. The water of the Sind is beautifully clear by comparison. This river winds for miles through some fine pasture-land and water-meadows filled with tall handsome sedges, whilst the surface of the water is covered with innumerable flowers of white water-lilies.

The river ceases to be navigable beyond Gandarbal. From Gandarbal the Sind Valley extends some 58 miles up to the Zoji Lá, a pass leading into Baltistán. The total rise is about 6,000 feet.

The lower part of the valley is extensively cultivated, rice being the principal crop. Fruit-trees are also largely grown near the villages, which have an appearance of prosperity. Higher up the valley cultivation becomes more limited, and the villages contain a poorer class of people.

The vegetation of the valley from a botanical point of view is rich and varied. There is plenty of water brought down by numerous snow-fed streams; and the hill-sides, especially such as face the north, are thickly clothed with fine forests. As the elevation increases the sub-montane character of the vegetation gradually gives way to more temperate forms until, after passing the gorge below Sonamarg, a distinctly alpine element is observed, as at Gulmarg, the elevation of which place is about the same.

The village of Sonamarg consists of a few miserable-looking huts uninhabited during the winter months. It boasts, however, of a Post Office and Telegraph Office. After crossing the river at Sonamarg the road passes over undulating pasture ground, and here and there through patches of forest composed chiefly of *Pinus extelsa*, mixed with willow and Himalayan poplar.

The two principal feeders of the Sind River join near Báltal; the larger one from the south rises in the neighbourhood of the famous Amarnath Cave, whilst the other, a small narrow torrent, comes in from the direction of the pass.

Báltal is a little over 9,000 feet. There is no village here; only one or two huts occupied by the dâk runners between Kashmir and Leh. On the day following my arrival at Báltal I explored for some

miles the valley to the south leading to Amarnáth. For considerable distances the river is completely covered over with snow. Further up we came to a place where, owing to the absence of snow bridges, it was impossible to proceed further. Many interesting plants were collected in this valley.

The Zoji La is rather a dangerous pass when covered with snow; otherwise there is no difficulty whatever. I crossed over on the 29th June, at which time there was no snow on the road.

The views from the summit looking north and south are striking from their contrast. On the northern side the mountains are bare and rocky, and there is not a tree to be seen in the valley leading to Drás; whereas on the Kashmir side the Sind Valley is beautifully wooded. The different climatal conditions prevailing on the Drás side are indicated by the presence of many Tibetan plants; also by the whistling cry of the marmot. The top of the pass is 11,287 feet. Some interesting plants were found on the ridge to the west of the pass up to 12,000 feet.

After descending the valley for a few miles I made another detour towards the east and collected a variety of specimens near a glacier at about 13,000 feet.

My camp was pitched at Minimarg, 4 miles further down the valley; and many new plants were collected on the way.

Before reaching Minimarg we passed a very promising-looking valley towards the east, called Suknullah, which I explored on the following day, the camp in the meantime having been moved down the valley to Mataiyan. The view looking up towards the pass is very fine. The sides of the valley here are very precipitous, and apparently quite bare of vegetation.

Between Mataiyan and Pandrás the road crosses from the right to the left bank. A tall aromatic fennel-like plant, called "*A'pat Kanphur*" (*Ferula Jæschkeana*), is very abundant in this part of the valley. It is much valued by Kashmiris as a fodder plant, and is cut for winter use. On the Pir Panjál it is called "*Kángwa.*" The valley suddenly opens out before reaching Drás, an unimportant-looking place consisting of a few scattered hamlets. There is, however, a small fort here, also a tehsil and Post Office. The elevation is just under 10,000 feet. The surrounding mountains are very bare and rocky. Trees are scarce; only a few willows and poplars are to be seen near the villages. I halted for one day, and left on the 3rd of July with a new set of ponies and coolies.

The road to Leh continues down the valley in an easterly direction.

This is also the ordinary route to Skárdu, but a very hot one during the summer months. The route which I took is a high-level one, and much more interesting for botanical exploration.

After crossing the valley in a north-westerly direction through fields of buck-wheat, *masur* (*Lens esculenta*), etc., the road begins to rise in zig-zags along a very rocky valley almost bare of vegetation for the first few miles. At 12,000 feet the botany becomes more interesting. The white variety of the marsh marigold fringes the sides of the stream; a brilliantly yellow-flowered Draba was conspicuous, growing in masses near the top of a pass; and mixed with it was a rare Anemone (*A. albana*). The tents were pitched at a place called Pattarkhán Brangsa, between 12,000 and 13,000 feet. There is an enormous rock here which affords good shelter for coolies.

I went over the Marpu Pass on the following day. It is over 15,000 feet, and forms a portion of the watershed between the Drás and the Shingo rivers, both of which flow into the Indus. It is quite an easy pass, but the path is a very stony one, and on this account a little more snow would have been an advantage.

The next camping-ground is at Pattar Dokás, about 2,000 feet below the pass. The stream of this *nullah* flows into the Shingo River, a few miles below the village of Golteri, which was my next halting stage. This village is on the right bank of the river, and is situated on a plateau of moraine debris. The elevation is about 11,000 feet. I stayed here for one day as the botany was interesting, and I had to make arrangements for another set of coolies. The pencil cedar (*Juniperus excelsa*) is plentiful in this valley, but the trees are stunted. The Shingo River rises near the Burzil Pass and flows into the Shigar, one of the tributaries of the Indus.

I left Golteri on the 7th of July and went down the valley on the left bank to a place called Chamlong. The river is [illegible] rope bridge just below Golteri; close by here and alongside the river is the village polo-ground. The path keeps near the river all the way, and is very rocky in places. One great feature of this valley is the abundance of a very floriferous sweet-scented rose (*R. Webbiana*). The flowers vary from deep pink to white. The people here call it *sermang*. Many other interesting botanical specimens were gathered. A wild-looking valley, called the Shwáran *nullah*, has to be crossed by a rope bridge before reaching Chamlong.

On the following day we continued down the river to the village of Fransart by an extremely rocky and rather difficult track, and some parts of it must be quite impassable when the river is at all high. There is an alternative and longer route at a much higher level. The elevation of Fransart is about 10,000 feet. There is a large extent of

cultivated ground in this part of the valley, including many fields of barley. After changing coolies we had before us a steep ascent up to 12,000 feet in order to cross over into the Shigar Valley. The small village of Shigar is prettily situated at some distance above the river. The valley just here is rather wide, and some side valleys open into it on the opposite side, where the mountain scenery is very grand. Their lower slopes are clothed with forest, consisting chiefly of *Pinus excelsa* and *Juniperus excelsa*. Mosquitos are very troublesome here at about sunset, and at higher elevations up to 14,000 feet they are even worse. It must of course belong to a different species from that of the plains of India. The wild flowers here are very beautiful and interesting. On the following day we had to cross the Shigar over rather a difficult rope bridge, 112 yards long. The loads were taken over by a few experienced men. The water is very deep here, and so quiet that one wonders why they don't use ferry boats instead of this twig bridge, which has to be constantly repaired. After seeing all the baggage safely over we took the path leading to the entrance of the Karpuchu Valley, where there is a village called Matral, and a fort or tower built of alternate layers of wood and stone. From here the road winds up the valley gradually ascending through a forest of pine and juniper to our next camping-ground at about 12,000 feet. This place is called Karpuchu, and consists, as far as I could see, of a single shepherd's hut. On the following day we made another march further up the valley to about 14,000 feet. Heavy rain came on before the camp could be pitched, and an uncomfortable night was spent under wet canvas which was frozen hard before the morning. We had not far to go the next morning (July 11th) before reaching the summit of the Bári Lá, about 15,000 feet. There are several small tarns on the further side. A good deal of snow was lying about, and vegetation was scanty, consisting chiefly of Primulas, Sedums, and Saxifrages A very curious plant called Galgal is abundant here. It is a species of Saussurea (*S. obvallata*). The pale yellow bracts are very large and loosely envelope the composite heads of flowers, which are strongly scented. The stillness at these high elevations is always very striking. After descending, however, for a short distance on the other side, the air was filled with the shrill cries of the marmots. Our next camping-ground was close to a big mass of rock at about 14,000 feet, and looking down the valley towards the north-west one could see a small portion of the Deosai Plains.

Coolies and all were glad to leave this bleak and inhospitable spot, but we had a hard day before us, with two passes to get over, and a long steep descent into the Satpur Valley.

The first pass we came to is called the Shátung Lá, about 13,500 feet. There was a good deal of snow here in a melting state, which made walking rather difficult. The descent is into a valley watered by a stream called the Tikatsichu. From here the path ascends to the pass leading into the Kharbula *nullah*. There is a small lake at the summit of this pass, and a good view of the Deosai Plains can be seen from here. The path descends steeply from here into the Satpur *nullah*, at the head of which is the camping ground called Ronishikar or Jalna Bránsa. It occupies a small piece of flat ground on the spur of a mountain, and the elevation is about 12,500 feet. Looking down the valley a view is obtained of some distant mountains on the further side of the Indus.

The floor of my tent was carpeted with edelweiss, *Anemone albana*, and other interesting specimens.

The path down this valley is very steep and very stony. My intention was to have gone on to Skárdu from here, but finding the botany so interesting I decided to halt halfway near the village of Satpur. Several bushes of a handsome Spiraea (*S. hypericifolia*) were met with on the way down. This species is not included in the Flora of British India. My friend Captain Hunter Weston, R.E., brought me flowering specimens of this shrub discovered by him in Baltistán three years ago. The plant, however, is well known to the natives who call it "*Sabeř*." The wood is hard and the bark is of a reddish-brown colour and smooth. Native shikáris from Kashmir nearly always take back with them a bundle of sticks cut from this shrub. Many other rare plants were also collected.

There is a good deal of cultivation in the neighbourhood of Satpur. The fields which have been skilfully terraced contained fine crops, especially of wheat and barley, nearly ready for the harvest. Other crops are peas, called here *kukan*, beans or *bakla*, the Balti name of which is *bararak*, and turnips (*gonglu*); wheat is called *kanak*, and barley is *nas*. The general name for all kinds of grasses is *kash*. Several kinds of fruit trees are also grown here, such as walnuts, mulberries, and apricots.

After leaving Satpur the road follows the bed of the river, and then over grassy and more or less marshy land until the lake is reached. The path then ascends and is carried along the east side of the valley at some distance above the lake. The lake occupies the whole width of the valley, which is about a mile across; and its length is nearly two miles. It contains fish. We passed a curious old wall which extends down the side of the mountain and ends in a fort overlooking the lake. After passing the lake the path (a very bad one) keeps more or less by the river until it suddenly emerges

into the Indus Valley immediately opposite Skárdu. I halted two days here, and my time was fully occupied replying to the numerous letters which had been awaiting my arrival for many days, and attending to the large collection of specimens recently collected.

Captain Townsend, of the Central India Horse, was here in command of some Kashmir Imperial Service Troops, and was the only Englishman in this place when I arrived. I am much indebted to him for his kind assistance in various ways, as well as for his hospitality. The Tehsildar, who is practically the governor of Skardu, was also most obliging. A great deal might be written regarding the history of this interesting place, also of the scenery, which is very striking. All cultivation is carried on by means of irrigation, the channels for which extend for miles from the sources of supply. The numerous villages which are scattered throughout the valley are conspicuous by their settings of vivid green patches in the midst of a sandy desert. A very superior kind of apricot is to be obtained from some of the gardens. When ripe it is extremely juicy, more like a plum in this respect, and the flavour is delicious. It is called *chilu*, but is very different from the ordinary hill apricot met with in this country, the flesh of which is more or less of a firm consistency. Walnut trees are plentiful, also some superior kinds of mulberry.

I left Skárdu on the 17th of July for Katzura, a small village about 16 miles up the valley towards Rondu. It lies on the left bank of the Indus, close to the large torrent which comes down roaring and foaming out of the Shigarthang Valley. This is a very trying march owing to the long stretches of sand which throw off an immense amount of heat during the day. For the first few miles out of Skardu the path is shaded by an avenue of poplars, but suddenly this avenue abruptly terminates at the edge of a sandy desert. One of the villages I passed through was inhabited by Kashmiris. I found a man manuring his tobacco field with freshly-cut plants of a kind of thistle (*Cnicus arvensis*), which he called *kanish*. The tobacco was of the coarse round-leaved variety (*Nicotiana rustica*).

I rested for a short time at the village of Hoto, and was much refreshed by some apricots which were presented to me. The wheat here was much rusted. This village is liable to the encroachment of the Indus as well as to inundations of blown sand. After this the road begins to rise gradually towards Katzura. A pretty lake is passed, and soon after that the Shigarthang Stream is crossed by a bridge. A few hundred yards further on is the village surrounded by fruit-trees (walnuts, apricots, and mulberries). On arrival I was presented with a basket of excellent large round black mulberries. This variety is called "*kachilosa*" or "*shahtut*." Wheat,

beans, and tobacco are cultivated here in small patches. The elevation of this place is about 8,000 feet.

The next day's march was to Shigarthang, about 16 miles up the Shigarthang Valley. Soon after entering this valley the road takes a sudden turn to the south. The ascent is easy at first. The village of Tzok with its fruit-trees and grassy meadows is prettily situated in an open part of the valley. From here the road turns round to the north and is carried by a bridge to the left bank. The scenery now becomes very wild. Bare precipitous rocks hem in the valley on all sides and the road becomes steep and stony. Vegetation is very scanty, but what there is is interesting. The *Saber* (*Spiræa hypericifolia*) was found again. A kind of ash (*Fraxinus xanthoxyloides*) was plentiful at about 9,000 feet in fruit, also *Juniperus excelsa*. After this the road takes a sudden turn to the west, and ascends steeply between innumerable boulders of an enormous size, severed from a mountain on the left, and extending down to the river, where they help to form a series of beautiful waterfalls and cascades. Above this is a small village, near which I came across some of the tiniest full-grown cattle I have ever seen. They were covered with long black hair, and looked more like bears.

At Shigarthang the main valley takes a sharp turn to the west towards the Alampi Lá and the Banok Lá. Two other valleys open out into this bend of the Shigarthang Valley, on the east the Dora Lumba from the direction of the Burji Lá, and the Munda Lamba from the south. The village is on the right bank of the main stream and is situated on a high plateau composed of moraine debris. The elevation is over 10,000 feet.

The people of this place are a wild-looking lot, but cheerful and full of humour. Their head gear is of the Hunza pattern, *viz.*, a long bag with the edges rolled in until it forms a cap. The men, whose lot it was to carry the loads on the next march, appeared in the morning with their caps decorated with the crimson flowers of *Rosa Webbiana*, shouting and chattering in a language which none of my servants could understand. As these men had to accompany me over the Alampi Lá and for some distance down towards Astor, arrangements had to be made for their rations, and I was unable to make a very early start. We made a short march therefore to a place, called Rimo Chagma (or Ringmo Chami), close to the river and between 12,000 and 13,000 feet, and on the following day started with the intention of going over the pass.

By the time, however, we had reached the foot of the first serious climb towards the pass, it was too late in the day to attempt the long and difficult journey across the snow. The weather was perfect, and

without a cloud in the sky. The elevation was about 13,000 feet. In the evening I went up for a few miles towards the head of the main valley and collected some plants.

Early the next morning (July 21st) we made for the pass, beginning with a steep more or less grassy ascent up to 14,500 feet. Beyond this is a wide *corrie* surrounded by an amphitheatre of precipices, and with a lake at the bottom and patches of snow all about. From here turning to the west we had another stiff climb before us, with a good deal of snow to cross at a disagreeable angle, for the snow was frozen hard and steps had to be cut. Having reached the top of this slope we found ourselves in another hollow basin. Here was a much larger lake all frozen over. There was nothing now to be seen but rocks and ice and snow.

After skirting the shores of this lake we reached the foot of the final climb, a steep staircase of rock, and at last arrived at the summit of the pass, the elevation of which is 15,200 feet. The descent on the western side is into a valley which was covered with snow for 2 or 3 miles. The upper part of the snow slope was very steep and hard, and steps had to be cut for a considerable distance. We got off the snow at about 1,000 feet below the summit of the pass, and rested for a short time by some big boulders. From here the finest view of Nanga Parbat is obtained, and it was seen to perfection on this day.

Looking about amongst the boulders for botanical specimens I came across some human bones, and beside them a few pieces of cloth, also a portion of a gun-stock. They were all together in a sort of small cave formed by an overhanging boulder, which may have afforded the unlucky traveller temporary shelter, but which eventually became his tomb.

We had to go down the valley to about 12,000 feet before we could find a suitable camping-ground. The botany was most interesting, and many new plants were discovered. The whole way down to Gudhai on the Gilgit Road the scenery in this valley is very fine. It is richly wooded in parts, the chief trees being *Pinus excelsa*, *Juniperus excelsa*, and willows. We passed a few small villages, the most important of which is Bobin; its elevation is a little over 11,000 feet. Some fine *nullahs* open into this valley on either side. At about 10,000 feet Karbe Village is passed. Near here I came across a number of Commissariat coolies, mostly Punjabis, cutting grass for the Gilgit Transport animals.

From here there is rather a steep descent to the Burzil Valley. The two rivers join close to Gudhai, the elevation of which is about 9,000 feet.

We are now on the main Gilgit road, a few miles from Naugáun, where I dismissed my Shigarthang coolies, and got a fresh set to take my loads on to Astor the next day.

On arriving at Naugáon I found the entire population either playing, or assisting as spectators, at an exciting game of polo. The flat roof of a house served as grandstand, and here the village band played a variety of tunes.

The next day's march was to Astor. The road for the first few miles is very rough and dusty. This is really a piece of the old road, the new portion, which is being carried at a higher level, not then being open for traffic. After crossing the Burzil Stream and the Astor River, the road ascends to Gurikot where there is a good deal of cultivation and many groves of fruit-trees. From here the new road leads by easy gradients to Astor. The edible pine (*Pinus Gerardiana*) is common in this portion of the valley, the elevation being about 8,000 feet. The local name is *Garol*. *Juniperus excelsa* is also abundant here, and is called *chili*.

The scenery of this portion of the valley is remarkable. The villages on either side are perched on the slopes of an enormous moraine, through which the river has cut a deep channel with high precipitous cliffs of moraine debris on either side. Astor itself is high above the river.

The Hollyhock (*Althæa rosea*) with pure white or mauve-coloured flowers is abundant here along the edges of cultivated ground. It is not indigenous, and was probably introduced at some time or other along with the large white-flowering Iris, for planting over graves.

I remained at Astor for a day, and left on the 26th July for Daskin. After passing the fort the road descends to Harcho, and then ascends to Daskin, keeping high above the river, Daskin being considerably higher than Astor.

The sides of the Astor Valley look almost completely bare of vegetation. There are, however, many juniper trees scattered over the rocky hill-sides which at a distance give the grey colour of the rocks a speckled appearance. Some interesting plants are to be found in the rock-crevices, and in the more shady nooks. At elevations above 10,000 feet the climate is cool and moist, and the vegetation is correspondingly luxuriant. These conditions prevail throughout this part of the country, and up to and beyond Gilgit. Nearly every *nullah* which opens into these hot, dry and comparatively low valleys afford views of forests and green pastures extending up to the snow line.

Beyond Daskin the road still ascending passes through

the lower portion of one of these forests, which extend more or less all along the high-level ridges from Astor to Doian. This proved to be one of the most interesting bits of botanical ground met with during the whole of my tour. The principal trees are *Pinus excelsa*, *Pinus Gerardiana*, and the Pencil cedar. Streams of clear water cross the road at intervals, and many rare plants may here be found. After passing through this forest the road again enters the arid waterless tract, until Doian is reached, close to which place the same kind of forest extends.

There is a small bungalow at Doian belonging to Messrs. Spedding & Co., the road contractors. As rain came on in the afternoon, I was glad to avail myself of it, and so save my tents from getting wet. There is a splendid view from here in clear weather looking down into the Indus Valley and across to some very high snowy peaks beyond.

It rained steadily all night and the next morning, and remained cloudy during the rest of the day. This was an advantage, as the next march down to Rámghát is a very hot and trying one on a sunny day. The old route over the Hattu Pir must however have been very much worse.

At Rámghát there is a bridge over the Astor River, which rushes through the gorge here at a furious pace. This spot is known locally by the name Shaitán Nára. The camping-ground is about a mile beyond this, on the left bank of the Dachkat or Misikin Stream. This torrent, like many other glacier streams, rises and falls at different times of the day, and during the summer months it is quite unfordable towards evening.

From this place there is a good road mostly over a stony plateau to Bunji, the elevation of which is under 5,000 feet. This used to be a much more important place until the great flood of 1841 destroyed it and laid waste a large extent of cultivated land. There is a very good bungalow here and a garden of fruit-trees in which I pitched my camp.

Captain Yeilding, D.S.O., arrived here that evening from Srinagar, and I had the pleasure of his company as far as Gilgit. The distance is nearly 40 miles by the new road. It is certainly a journey to be undertaken as quickly as possible, for the whole valley is extremely hot during the day time, there being no shade whatever until you reach the village of Minawar, about 8 miles from Gilgit. Finding that my coolies were a long way behind, I was obliged to halt about 6 miles short of this place on a gravelly plain near the river. As some portions of the new road between this

place and Minawar were not then open for traffic, we had some difficulty with the loads, epecially at certain spots where the debris from the new road was being shot down on to the only other possible track. I found Captain Yielding at Minawar early the next morning, and we rode on from there to Gilgit.

The views of the snowy peaks towards the north-east were wonderfully fine, one of them, Rakapushi, over 25,000 feet standing out clear against the blue sky. The first sight of Gilgit from the Jutial Ridge, is very striking, as you look down upon the wide expanse of orchards and cultivated fields, the colours of which appeared so vivid by contrast with the surrounding bare and dazzling rocks.

I stayed at Gilgit for one day, and left early on the morning of the 2nd of August for Nomal in the Hunza Valley. After crossing the bridge over the Gilgit River the road follows the left bank of that river in an easterly direction for about 3 miles, and then turns round towards the north up the Hunza Valley. The distance from Gilgit to Nomal by this road is about 16 miles. This is a very hot and trying march in summer, as there is not a particle of shade except at one place, about halfway, where a landslip has brought down some big boulders. There is no water either, except that of the river, which at this time of the year is quite muddy and looks more like a mixture of ink and milk. After entering the Hunza Valley the road traverses for some miles an undulating sandy tract covered in parts by a large bushy species of *Ephedra* (*E. intermedia*). After passing the *halfway boulders* the road is carried for a considerable distance along the side of a precipitous hill, descending again to more level ground before reaching Nomal. The elevation of this place is 5,500 feet.

On the following morning I left the Hunza road, and went up the Naltar Valley towards the north-west. For the first few miles the valley is confined within bare precipitous rocks. Some interesting specimens were gathered near the river, which has to be crossed by bridges four times before reaching the village of Naltar, the elevation of which is about 6,500 feet. There is plenty of vegetation here, and some good crops were seen of wheat, barley, *kangni* (locally called *pirpit*) and *chena*. Walnuts, apples, and vines are also grown here.

After resting for a little while I continued up the path for a few miles, and found a capital camping ground in a forest of silver fir at an elevation of about 9,000 feet. Beyond this the valley opens out, and is clothed with fine forests containing silver fir juniper, and blue

pine (*Pinus excesla*). On the slopes facing the north-east these forests extend to a considerable elevation mixed with birch and willow. There is a path leading up to the head of this valley to a pass which separates it from the Chaprot Valley. Numerous glacier-fed streams come down into this valley from either side. As I had only two days to spare for botanical exploration, I found it difficult to decide as to which route to take on each day, there being so much promising-looking ground in every direction. My expectations were fulfilled on the first day, and the cooly-load of drying paper which I took with me was very soon used up, and the collecting box crammed full of rare specimens long before I had reached any great elevation. In fact, owing to the richness of the vegetation and the difficult nature of the ground, I managed to get up only to about 2,000 feet above my camp.

I explored another side *nullah* on the following day (August 5th), and found this one even more difficult. In one place I had to circumvent a big waterfall, and by the time I had got round to the top of it evening was coming on and rain too. This waterfall was rather a remarkable one on account of the rocks of all sizes which were constantly being carried over the fall. My attention was first attracted by the peculiar sound produced by the rattling of the stones.

I much regretted being obliged to leave this beautiful valley, which would require several days for its proper exploration. There was a good deal of rain in the night, and all the streams were much swollen when I left for Nomal the next morning. The river too was very high, and the two bridges near the village of Naltar looked very insecure when we passed over them, and one or both must have collapsed very soon afterwards.

On reaching Nomal I was told that the Gilgit bridge had been carried away, and that the only communication with Gilgit was by the rope bridge. The damage done by swollen rivers during these few days appears to have been caused by a wave of warm air acting over a large extent of country; for, on my way back to Kashmir, I saw in many places signs of the havoc done to roads, bridges, and village water-courses, all of which happened at about the same time. At Bunji one of those curious mud streams came down and destroyed the water-courses; and at Rámghát the Dachkat torrent gave much trouble. At Harcho, in the Astor Valley, a bridge was carried away and in the Kamri Valley a good deal of damage was done.

In order to escape the heat of the Hunza Valley during the day, I left Nomal at about 2 A.M. and reached Gilgit in time for breakfast. The rope bridge was a decidedly disagreeable obstacle at the end of a long and tiring march. In addition to the sense of insecurity which

a man with a fairly good head for giddy heights need not be ashamed of, and with an inky black river rushing beneath him at a racing pace, there is a considerable amount of physical exertion required.

I remained at Gilgit for two days, and I gladly take this opportunity of expressing my obligations to Mr. Robertson, the Officiating British Agent, for his kindness and hospitality. I had the pleasure also of making the acquaintance of Surgeon-Captain Roberts, the Medical Officer attached to the Agency. His knowledge of gardening does justice to the capabilities of the climate in the production of good vegetables and fruit. He also takes an interest in botany, and through his kindness I have since received from him a very interesting set of specimens collected in the neighbourhood of Gilgit. I am also indebted to Captain Younghusband, not only for many acts of kindness during my stay at Gilgit, but also for a very interesting collection of plants gathered by him during his memorable journey across the Pamirs.

In a dry and rocky country like Gilgit there must always be considerable difficulty in arranging for a continuous supply of fodder for any large number of transport animals. Along certain sections of the Gilgit road beyond the Burzil Pass, the local supply being practically nil, a good deal of expense is necessarily incurred by carriage.

With the exception of the village sites, where cultivation is carried on by means of irrigation channels, the hill slopes on either side of the road, in consequence of the very small amount of annual rainfall, are extremely bare of vegetation, and what there is is coarse and unpalatable. The most abundant plant on these hill-sides is a species of worm-wood (*Artemisia maritima*), which mules and donkeys will eat for lack of anything better. I have seen no record of any species of *Artemisia*, several of which are known to occur in India and along the north-west frontier, as affording fodder for ponies and mules. But two Himalayan species, *viz.*, *A. parviflora* and *A. sacrorum*, have been mentioned as being eaten by sheep and goats.

A certain amount of grass and weed herbage is to be found along the edges of irrigated village fields, which even, were it not required by the villagers for their own animals, would prove to be but a small contribution.

Large quantities of grass and weeds of sorts had to be procured last summer from the nearest *margs* lying within the more elevated moist zone, and accessible from the main valley by certain *nullahs*. The grasses and other plants collected from these localities should afford excellent fodder in the form of hay. The great drawback to this source of supply is the expense of cutting and the carriage.

The section between Bunji and Gilgit offers at present the greatest difficulties, as there are so few villages in the neighbourhood. There are, however, several abandoned village sites, where, I am informed, attempts have been made, after repairing the old water-channels, to grow crops. In a dry rocky or sandy country it is wonderful how luxuriant the growth of vegetation becomes by irrigation alone. Every opportunity should therefore be taken to utilize any surplus village water, and as far as possible to repair and make use of the old water-channels of the abandoned villages. By the use of manure, of which there should be an ample supply, considering the large number of animals daily passing up and down the road, a considerable quantity of green stuff might be rendered available.

I have reason to believe that large quantities of valuable fodder might be prepared locally in the form of silage. Many nutritious plants are rejected by animals by reason of the thorns or bristles with which they are protected. In a comparatively rainless and rocky country like Gilgit this is the usual character of the spontaneous vegetation. The same plants, which only camels or donkeys will touch in a fresh state, would, after being siloed, become palatable and wholesome food for ponies as well as for mules.

I left Gilgit in the afternoon of the 10th of August for Mináwar, and on the following day rode to Domel in the Indus Valley, close to the flying bridge erected by Captain Aylmer, R.E. The views from here of Nanga Parbat and Rakapushi are exceedingly fine, and I was fortunate in being able to see these wonderful mountains by moonlight as well as at sunset and sunrise. I rode into Bunji the next morning and spent the rest of the day there, and collected some plants in the evening.

I rode to Rámghát on the following morning (13th August) and walked from there to Doain, a steep ascent of 4,000 feet, and on the following day explored the ridge above Doian up to 12,00-13,000 feet. There were fine views looking over into the Leta and Buldár *nullahs* and down the Indus Valley towards Chilás. A large number of most interesting plants were collected in the forest above Doian and on the open parts higher up, the most important discovery being that of *Pyrola secunda*, a species new to the flora of British India.

On the 15th I got as far as Harcho, and arrived at Astor on the following day. I had to stay here four days to try and recruit my health, which had commenced to give way at Gilgit owing to extremes of temperature and over-exertion.

Mr. Blaker, of the firm of Messrs. Spedding, Mitchell & Co., had a permanent camp here, and he gave me much assistance and was most kind and hospitable.

I left Astor on the 21st, intending to go as far as Chugam below Rattu in the Kamri Valley, but was detained a short way below where the Rupal Stream joins the Astor River. A bridge had given way and was being repaired. There is a grand view from here looking up towards Nanga Parbat. Some interesting specimens were collected near the banks of the river.

The next day I made an attempt to reach the village of Társhing in the Rupal Valley, and at the foot of one of the big glaciers below Nanga Parbat. I managed to get up the valley about halfway, when I unfortunately became ill again and I had to return. The botany near the glacier must be extremely interesting, and I still hope I may be able some day to explore this locality.

I encamped that night near the village of Rattu in the Kamri Valley, elevation 6,800 feet. The valley here is open, and with fine views of Nanga Parbat to the north and the Mir Málik Valley which joins the Kamri Valley a few miles further up towards the south-west. Beyond the village there are broad stretches of undulating pasture land, known as the Rattu plains. The whole valley, in fact, is beautifully clothed with grass, and there are some fine patches of forest, especially on the sides of the *nullahs* coming down to the left bank of the river.

I went on to Gumin the next day, a very beautiful march, and excellent for botany, elevation about 9,000 feet, and on the 24th arrived at the camping-ground of Kálapáni the elevation of which is about 10,600 feet.

On the following day, leaving my camp here, I started off in the early morning to explore one of the *nullahs* on the western side of the valley. I managed to get up to an elevation of 12,500 feet where a large number of interesting specimens were obtained.

On the 26th I went over the pass (about 13,000 feet) and descended about 3,000 feet on the other side to the village of Gurikot in the Burzil Valley. I collected some interesting plants on the pass. One very striking feature in the vegetation of the upper part of the Kamri Valley is the abundant growth of a most remarkable cruciferous plant called *Megacarpœa polyandra*. It has thick hollow stems upwards of 4 or 5 feet high. It grows in open grassy places, and at some little distance these tall herbaceous plants look very like young trees. The local name is *chach*, and the young leaves are used as *ság* or spinach. It is also found on the Pir Panjal Range, where it is called *chattarhák*, or *chatri*.

I marched to Gurais the next day (27th), about 13 miles of very pretty road along the banks of the Burzil Stream, which joins

the Kishenganga about one mile above Gurais. I had to stay here and rest for a few days, and was getting back my strength when I unfortunately met with an accident resulting in a broken rib. This of course interfered a good deal with further botanical exploration. I had with me, however, an experienced collector who was on the look out for anything new.

The poisonous grass (*Stipa sibrica*) is abundant on the wooded slopes of the Gurais Valley.

I have reason to believe that the results of this tour will prove to be a valuable contribution to our knowledge of the botany of Baltistán and Gilgit. A complete set of the specimens has been prepared for the Saharanpur Herbarium; and two other sets have been distributed, one to the Royal Herbarium at Kew and the other to Dr. King at Calcutta. The whole of the mosses, of which a large collection was made, have been sent to Dr. Brotherus at Helsingfors in Finland for determination, also a complete set of the grasses to Dr. Hackel in Austria.

The remaining sets will be distributed next cold weather to various institutions in Europe, and elsewhere by way of exchange.

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SAHARANPUR,
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